# HOW-TO BOOKLET #3148

# CONTOLLING VEGETABLE PESTS ORGANICALLY

## TOOL & MATERIAL CHECKLIST

- ❑ Reemay
- ❑ Traps
- ❑ Rotenone
- ❑ Ryania
- ❑ Kimberly
- ❑ Neem
- ❑ Saladilla
- ❑ BT (Bacillus thuringiensis)
- ❑ Beneficial Nematodes
- ❑ Insecticidal Soap
- ❑ Pyrethrin

***Read This Entire How-To Booklet For Specific Tools and Materials Not Noted in The Basics Listed Above***

Organic pest control doesn't mean substituting naturally occurring poisons for synthetic ones and gardening as usual. You need to make two changes in your basic thinking:

- Accept that most insects are non-pests and even helpers, and stop trying to kill every insect you see in your vegetable garden.
- Accept the occasional hole and bite in your produce as a natural part of raising healthy, residue-free food.

Once you have accepted these new ideas you can move on to learning about organic pest control.

**Fig. 1: Lace wing adult and larva**

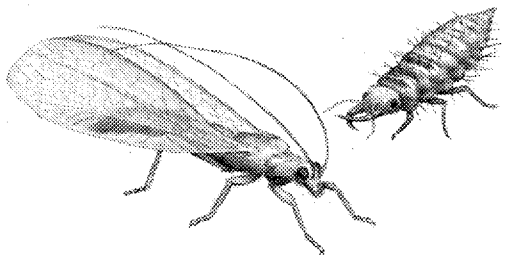
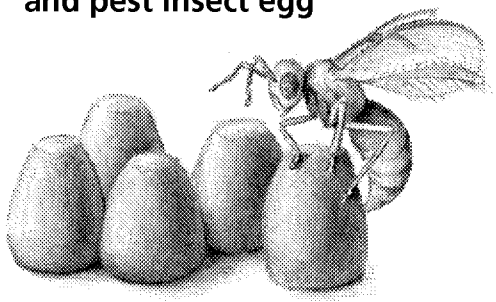


**Fig. 2: Trichogramma wasp and pest insect egg**



## 11 TOOLS FOR ORGANIC PEST CONTROL

Simple techniques and products make organic pest control work. Here's a brief rundown of the elements needed:

**Good Soil Care.** Well-fed and cared-for soil is full of tiny living organisms that feed and care for plant roots. Plants growing in such soil are pest resistant. Test and adjust your soil's pH to suit your plants. Add abundant quantities of organic matter—such as compost—every year. Till only when needed and never when the soil is wet, and don't use synthetic fertilizers or herbicides.

**Resistant and Suitable Plants.** There are many vegetable varieties that have disease and even pest resistance built right in. Choose resistant plants whenever you have the choice. Purchase plants that grow well in your region and you'll spend less time fighting problems.

**Good Plant Care.** Give every plant exactly what it needs. Thirsty, hungry, overwatered, or overfed plants are stressed plants. Stressed plants are prime candidates for problems.

**Eyes.** Use your eyes to spot potential problem situations before they turn into 4-alarm fires. Take a slow walk through your garden twice a week peering under leaves and observing what's going on. Write down when and what you see to help you predict things next year.

**Hands.** Your hands are great pest control tools. Use them for picking off or squashing pests.

**Beneficial Bugs.** You can purchase a number of garden helpers to hunt pests for you. Lace wing larvae (**Fig. 1**) are great predators of aphids, mites, and other small, soft pests. Lady beetles are great predators, but tend to fly away when released. Predatory wasps or *Trichogramma* wasps (**Fig. 2**) lay their eggs on pest caterpillar eggs so that the pest eggs never get a chance to hatch. To attract wild predatory insects, plant a patch of flowers and herbs such as yarrow, dill, and sweet clover to provide food and cover.

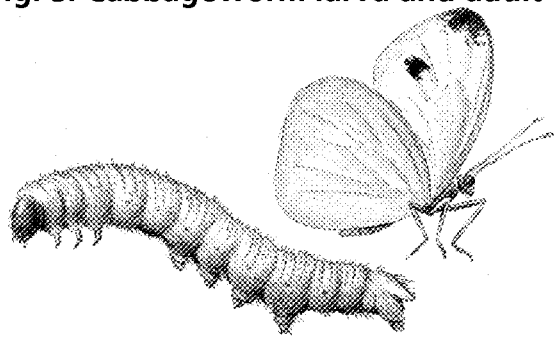
Beneficial nematodes are tiny worm-like creatures that hunt insects in the soil and kill them. They are related to pest nematodes, but are not harmful to plants. Purchase and apply them according to label instructions.

**Diseases That Make Pests Sick.** Pests get diseases just the way we do. The best-known example is BT (*Bacillus thuringiensis*). BT (or BTK) makes only caterpillars sick. Another type of BT (BTSD) makes only Colorado potato beetle larvae sick.

**Floating Row Covers and Other Barriers.** Floating row covers (such as Reemay and Kimberly Farm) are industry's gift to organic gardeners. They let the sun, rain, and air through, but provide total protection from invading insects. Spread them loosely over seedbeds or young plants and anchor the edges all around with soil or by stapling them to boards or lengths of old hose. Leave enough extra material so the cover can "grow" with the plants.

Other barriers, such as cardboard tubes, copper strips, and diatomaceous earth, also keep certain pests away from your plants.

**Fig. 3: Cabbageworm larva and adult**



**Traps.** Sticky yellow rectangles are useful for trapping a number of flying pests, including whiteflies. Staple a cotton ball soaked with clove or allspice oil onto a sticky yellow trap to catch cucumber beetles. Sticky white traps work for flea beetles. Hang or stake traps a few inches above the top of the infested plants. Replace them when they are filled or no longer sticky to the touch.

**Non-Toxic Sprays.** Water can drive certain pests away. Two other common household substances are also potent pesticides. Soap kills certain insects by dissolving their protective coatings. Commercial insecticidal soap is the most reliable, but you can experiment with liquid soap (not detergent). Oil kills insects by clogging their breathing pores and smothering them. Choose a highly refined summer oil or use cooking oil. For a double-whammy, mix 1 tablespoon of liquid soap with 1 cup of cooking oil. Use 1 to 3 teaspoons of the soap-oil mix per cup of water to make a spray. Test it on a few leaves and wait a day to be sure it doesn't burn the leaves before you spray the whole plant.

**Natural Poisons.** Natural pesticides are used only as a last resort when you would otherwise lose an entire crop. Rotenone, sabadilla, pyrethrin, ryania, and neem are insect poisons produced by plants. They are reasonably harmless to humans and other creatures. Organic gardeners use them because they break down rapidly in the environment. This doesn't mean they are totally safe. Use rubber gloves, a dust mask, goggles, and long sleeves when mixing and spraying them—and always follow the label instructions.

## 21 PESKY PESTS

Here are 21 of the most common vegetable garden pests and how to control them organically.

**Caterpillars and "Worms".** Caterpillars grow up to be beautiful butterflies and mysterious moths, but a few types can devour your vegetable plants with astonishing speed. Here's how to deal with the most common pests:

- **Cabbageworms** (**Fig. 3**) and **cabbage loopers** eat ragged holes in cabbage, broccoli, and other cabbage-family plant leaves. They also munch into broccoli heads, where they are hard to see and harder to remove before harvest. Cover seedbeds or transplants with floating row covers to exclude the egg-laying moths. You can leave the row covers on until harvest. Spray uncovered plants with BT once or twice a week if you see damage or worms.
- **Cabbage maggots** chew through the roots of cabbage, broccoli, and other cabbage-family plants, causing the plants to wilt and die. Cover seedbeds or transplants with floating row covers to exclude the egg-laying moths. Covers can be removed after a month or so. Treat infested soil with beneficial nematodes.
- **Carrot weevils** tunnel through carrots, leaving a maze of tiny brown tunnels. Cover seedbeds with floating row covers to exclude the egg-laying flies. Leave covers on until harvest. Resistant varieties are available. Treat infested soil with beneficial nematodes.
- **Corn earworms** (**Fig. 4**) and **European corn borers** specialize in corn, but will eat peppers and tomatoes also. Choose varieties with tight husks to minimize damage. Once the worms are

**Fig. 4: Corn earworm larva**

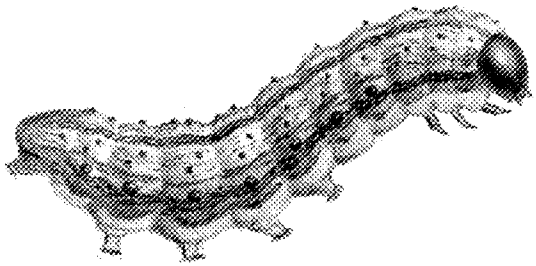


**Fig. 5: Hornworm larva**

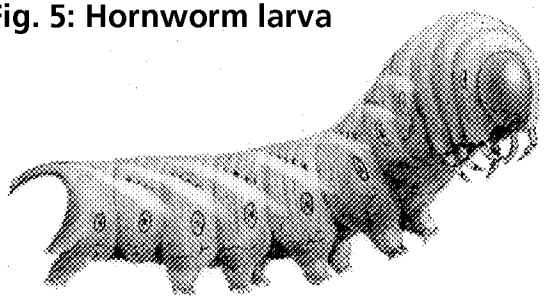


**Fig. 6: Colorado potato beetle adult and larva**

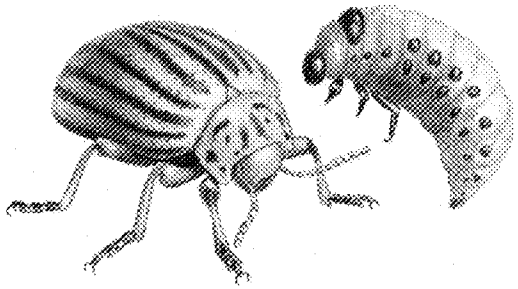
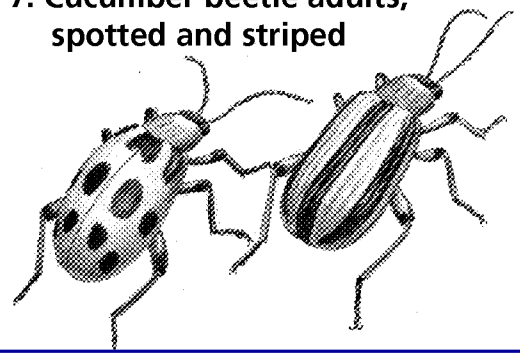


**Fig. 7: Cucumber beetle adults, spotted and striped**



inside the ears, they are very hard to control, so start control measures early in the season. Check the topmost, upright leaves of young corn plants twice a week. Spray the entire plant once or twice a week with BT if you find holes or worms. Sprinkle or spray just the newly emerged silks with BT, then put a few drops of mineral oil on the browning silks a few days later.

- **Cutworms** clip off young plants near the soil line. Put 2-inch-long cardboard tube collars around transplants, pressing them about 1 inch into the soil. Treat infested soil with parasitic nematodes or sprinkle BT bait on the surface a week before planting.
- **Hornworms** (**Fig. 5**) get quite large and can give you a thrill when you meet one in your tomato patch. They are rarely numerous, however; just pick them off one at a time (use gloves if you can't stand to touch them) and drop them into a jar of soapy water to kill them. If you find one covered with little white knobs, leave it be. Those knobs are parasitic wasp eggs, so let them hatch and go hunting for more hornworms.
- **Squash vine borers** burrow into the base of squash, melon, and cucumber vines, causing them to wilt and die rapidly. You may be able to save a plant by slitting the base of the stem, killing the worm, and mounding moist soil over the base of the plant. Cover young plants with floating row covers to exclude the egg-laying moths. Uncover plants when the first female flowers open. Spray just the base of the stems of uncovered plants with rotenone once or twice a week.

**Beetles.** Most beetles are not interested in your plants. Some, such as the familiar lady bug, hunt and capture plant-eating pests such as aphids. A few types are notorious plant-eaters themselves. Here's how to deal with the notorious few:

- **Colorado potato beetle** larvae and adults (**Fig. 6**) prefer potato leaves, but will devour tomato and eggplant leaves too. Use 10 to 12 inches of loose straw mulch around plants to discourage them. Or cover young plants with floating row covers until mid-summer to exclude flying adults. Spray uncovered plants with BTSD once or twice a week if larvae are seen. Shake adults off onto a sheet of cardboard and pour them into a bucket of soapy water.
- **Cucumber beetles** (**Fig. 7**) eat cucumber leaves and petals and will nibble on other vegetable plants as well. Their feeding itself doesn't damage your harvest, but they can carry and infect your plants with mosaic virus and bacterial wilt. These incurable diseases can kill your plants in days. Cover seedbeds or young plants with floating row covers to keep the flying beetles from getting even one bite. Uncover the plants when the first female flowers open. Spray uncovered plants with rotenone or sabadilla once or twice a week. Better yet, plant a few seeds every two weeks until mid-summer so you'll always have some new, healthy plants coming on.
- **Flea beetles** (**Fig. 8**) eat tiny round holes in the leaves of many vegetables. They can stunt or even kill seedlings. Cover susceptible seedlings with floating row covers until harvest (for greens) or until plants are a foot or so tall. Treat infested soil with parasitic nematodes.
- **Japanese beetles** eat anything and everything, or at least it seems that way some summers. Knock adults off plants onto a sheet of cardboard in the early morning and pour them

into a bucket of soapy water. Traps for the adults are commonly available but, since beetles fly a long way to find food, 1 or 2 traps will bring you more problems than you would have had with no traps. To use the traps, you need about 15 per acre. Install them in a circle around—but at least 50 feet away from—the plants you want to protect. You can kill the grubs by applying beneficial nematodes or milky disease spores to your turf, but don't waste your time and money if you can't treat at least an acre or more. (Maybe you can get your whole neighborhood to cooperate!)

**Fig. 8: Flea beetle adult**

**Fig. 9: Mexican bean beetle adult and larva**

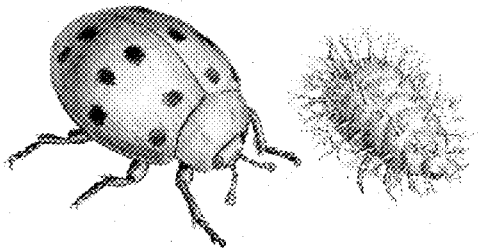


**Fig. 10: Leafhopper adult**

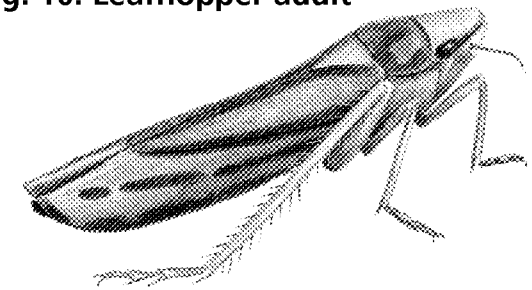
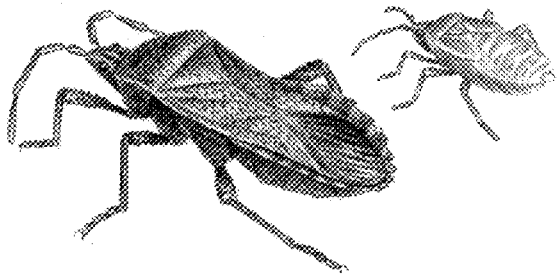


**Fig. 11: Squash bug adult and nymph**



- **Mexican bean beetle** larvae and adults (**Fig. 9**) can turn your bean leaves into skeletons. Cover seedbeds or seedlings with floating row covers to exclude flying adults until harvest. Handpick adults from uncovered plants or spray plants with sabadilla once or twice a week if larvae are present.
- **Sucking insects.** Mosquitoes suck our blood; certain insects do the same to plants. And just as we itch when bitten, plants suffer reactions to being bitten.
- **Aphids** cluster on stems or leaves. Infested areas may turn yellow and curl up. A few aphids can be knocked right off with a strong spray of water. Spray heavier infestations with insecticidal soap or summer oil.
- **Leafhopper** adults (see **Fig. 10**) "hop" when disturbed. Adults and immature hoppers suck plant juices, causing stunted plants and tip-burned leaves. A few hoppers can be knocked right off with a strong spray of water. Spray heavier infestations with insecticidal soap.
- **Spider mites** thrive in dry, dusty gardens. Leaves on infested plants turn yellow with fine spots, and fine webs can sometimes be found under leaves. Spray plants with a strong stream of water and mist daily to discourage the pests. Spray severe infestations with insecticidal soap or summer oil.
- **Squash bug** adults and nymphs (**Fig. 11**) suck juice from squash, melon, and cucumber leaves. Severely bitten leaves wilt and turn black and crisp; plants may die. Cover seedbeds or young plants with floating row covers to exclude flying egg-laying bugs. Uncover plants when the first female flowers open. Handpick the occasional bug, and spray badly infested uncovered plants with rotenone or sabadilla once or twice a week.
- **Whiteflies** fly in clouds when disturbed. Infested plants turn yellow, and leaves are covered with black specks. Heavy infestations can kill plants. Hang yellow sticky traps to catch adults or suck up flies with your hand-held vacuum. Spray severe infestations with insecticidal soap or summer oil.

**Slugs and Snails.** While not insects, these shellfish relatives are often thought of in the same context.

- **Slugs** and **snails** are the soft, slimy enemies of many gardeners. They devour leaves and fruits at night, leaving only shiny trails behind. Use overturned cabbage leaves or saucers of old beer to attract slugs. Collect and destroy slugs each morning. Protect succulent plants by surrounding them with a band of wood ashes or diatomaceous earth. Renew the bands after a heavy rain. Slug-proof an entire bed by circling it with a 2-inch-wide strip of copper. Stand the strip on edge and press it into the soil about an inch. Make sure no plant or mulch droops over the band to provide a slug crossing.

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